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COGNITIVE CORRELATES OF OUTCOME AND PERFORMANCE IN MARINE CORPS--ETC(1)
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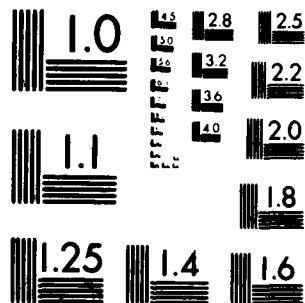
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Report AR-005

Cognitive Correlates of Outcome and Performance
in Marine Corps Recruit Training

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes relationships between assessed psychological characteristics and performance and attrition among Marine Corps recruits. The characteristics assessed were interpreted as measures of threat perceived by recruits. Recruits who were under high levels of threat showed the most unfavorable recruit training outcomes. Of the psychological indices, test anxiety was the one that related most strongly to attrition and performance.		

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Cognitive Correlates of Outcome and Performance
in Marine Corps Recruit Training

In contrast to our previous research that has focused on training unit factors (Novaco, Sarason, Cook, Robinson, and Cunningham, 1979; Sarason, Novaco, Robinson, and Cook, 1981), the present investigation is concerned with individual or person factors that distinguish Marine Corps recruits who attrite for psychological reasons. Of particular interest are the cognitive patterns which may predispose recruits to training failure. The inability to adjust to the demands of the training environment, may, in part, be linked to cognitive structures which predispose the recruits to experience stress.

Some recruits may be more prone to stress because of a proclivity to perceive events as threatening or as thwarts to personal goals. The tendency to perceive threat, when combined with an appraisal of personal capabilities as being low relative to the threatening event can be expected to result in poor performance and maladjustment. These negative influences are likely to be even more pronounced when motivation to complete training is low. The present study thus concerns the combined effects of the tendency to perceive threat, self-appraisals, and motivation as they influence training performance and attrition.

We assume that psychological stress interferes with performance, in part by detracting from a task orientation that is necessary for recruits to execute commands rapidly and efficiently. Performance failures, in turn, elicit aversive reactions from training supervisors (at times, from other recruits), which can heighten stress responses. Unless the recruit develops effective coping skills, this deficit-amplifying cycle may culminate in training setback or attrition. The fact that the majority of psychological/behavioral attrition occurs during the first two weeks of training suggests that susceptibility to stress is a relevant factor.

The present study concerns the general hypothesis that cognitive differences pertaining to stress proneness distinguish recruits who perform well in training from those who perform poorly. Stress proneness is in part determined by threat perceptions. The tendency to perceive threat is here operationalized by several indices. These consist of general psychological measures of test anxiety and anger proneness, as well as measures of threat perceptions specific to recruit training circumstances.

Sarason (1978) has construed test anxiety as "the tendency to view with alarm the consequences of inadequate performance in an evaluative situation" (p. 214). Test anxiety results from cognitive patterns of obsessive self-preoccupation which interfere with task-relevant activity. The test-anxious person engages in self-deprecatory thoughts and anticipates failure. These deleterious self-preoccupations are primarily stimulated by the evaluative component of test situations.

Another disposition related to threat perceptions is anger proneness. While it can be shown that anger has energizing functions so as to augment performance in particular circumstances of challenge, high levels of anger more typically impair performance by interfering with attention, information processing, and coordinated response sequences (Novaco, 1976). Proneness to anger is, in part, linked with perceptions of threat and personal thwarting, in the sense that anger occurs as a response to situations which the person perceives as devaluations of the self. The tendency to become angry, as a dispositional state, is a product of perceptual sensitivities and the inclination to interpret events as provocations based on their ego-threat properties. We therefore examine anger as a threat proneness factor specifically in terms of its occurrence with regard to ego-threat stimuli -- i.e. humiliation and verbal insult events. In the recruit training context, anger reactivity to such stimuli should be dysfunctional.

In addition to the anxiety and anger indices, we sought to obtain measures of threat proneness specific to recruit training. In this regard, factor-based scales were constructed from a recruit questionnaire to be described below. The threat proneness factors concern oversensitivity to aversive circumstances present in the training environment and the degree to which training is viewed as a positive, challenging experience.

While threat perceptions refer to cognitions about environmental demands, other cognitions related to stress are one's appraisals of coping resources. Lazarus (1966) refers to such cognitions as "secondary appraisals", which pertain to the individual's evaluation of personal capabilities, social support, and other resources for responding to potentially threatening events. In recruit training, negative perceptions of personal ability and of social support can be expected to result in poor adjustment. Attriters are expected to be more negative in their appraisals of coping resources than are graduates.

Persistence in enduring stressful demands is partly influenced by motivation. Recruits can be expected to persevere through the hardships of training as a function of the value they attach to graduation and to a Marine Corps career. Moreover, performance in work organizations has long been shown to be determined by motivational variables (Lawler, 1973). The present study, therefore, attempts to measure recruit motivation in order to determine its interrelationship with the stress factors as they jointly affect training performance. In general, it was expected that proneness to perceive threat, negative self appraisals, and low motivation would be associated with increases in attrition and decreases in performance.

Method

Subjects. The sample consists of 597 recruits obtained from the accessions on 10 randomly selected days of October, 1978, at MCRD, San Diego. The October cohort had a total accession of 1468. Data on the composition and comparability of our test sample relative to the monthly cohort and to yearly accessions was reported in Novaco et al. (1979). All evidence indicates our research sample to be highly representative. The recruit sample was distributed across 15 platoons, and the sample attrition rate is 11.72%. The discharge rate for the October cohort is 11.92%, and for the year (May 1977 - April 1978) it is 11.95%. The representativeness of the sample holds for psychological/behavioral discharges as well as total discharges.

Procedure. Testing was conducted in classrooms during the first day of processing. Participants were escorted to the testing area by training personnel, who then left for the duration of the testing session. Instructions were given that individual test protocols were not accessible to training personnel nor would they become part of any military record. The voluntary nature of participation was emphasized, and recruits who elected to participate (approximately 93%) signed a consent form. In addition to this administration of psychological tests related to stress, performance and attrition data were obtained from regimental archives. Details on the testing and archival analysis for this cohort can be found in Novaco et al. (1979).

Measures. The principle instruments used in the present study were: (1) the Recruit Background and Attitude Survey (RBAS), which consists of 100 items concerning attitudes toward the military and various aspects of self-perception and personal background. Responses are made on a five-point scale from "agree" to "disagree". This questionnaire was scored on the basis of a factor analysis described below; (2) the Novaco Provocation Inventory

Scale 1, "Military Motivation", consists of 18 items having an alpha reliability coefficient of .84. A high score on this scale reflects high motivation to succeed in training, positive self-perceptions, and beliefs of personal responsibility for performance. Scale 2, "Negative Self-Perception", contains 15 items having an alpha coefficient of .83. High scores indicate negative perceptions of personal ability, personal relationships, and the Marine Corps. Scale 3, "Macho", pertains to sports experience, physical prowess, and confidence in self. It is composed of 13 items with an alpha coefficient of .75. Scale 4 is a "Deviance" scale that reflects an affinity for the use of controlled substances and a background of conflict with authority. It contains six items having an alpha coefficient of .67. Scale 5, "Over-sensitivity", concerns reactions to yelling, crowding, and name-calling and general upset. It contains six items with an alpha coefficient of .59. Scale 6, "Depression", is an index of personal unhappiness and a troubled home life. The 12 items on this scale have an alpha coefficient of .46 which reflect the perception of recruit training as a positive, challenging experience. Although the estimates of internal consistency for several scales fall below the ideal, they do meet the recommended standards for preliminary research (Nunnally, 1967). The relatively low alpha coefficients are due to the brevity of these scales rather than to poor inter-item correlations. Finally, an additional RBAS subscale was constructed that is not a factor-based scale. "Motscale" was assembled from items on Scale 1 and Scale 2 which pertain to motivation. This was done in order to index motivation specifically, without contaminating effects from other items on the factor-based scales. "Motscale" consists of 15 items having an alpha coefficient of .71.

Three hundred nine- to recruit* completed the Novaco Provocation Inventory. This instrument is a modification of that reported in Novaco

(1975) which is intended to assess anger reactions to a wide range of provocation circumstances. Subscales of the NPI were initially developed by sorting items on an a priori basis into one of seven classes of provocation stimuli: (1) annoying, inconsiderate and rude behavior of others; (2) humiliation or verbal insult; (3) perception of personal injustice or unfairness; (4) social injustice; (5) frustration events; (6) personal clumsiness; and lastly, (7) physical assault to self or property. Item membership in these subscales ranges from 6 to 25 and respective alpha coefficients from .50 to .78. These items were sorted independently by the first two authors, resulting in a 93.75% rate of agreement concerning scale membership.

A factor analysis of these data produced factors closely corresponding to five of the seven classes of provocation events specified on an a priori basis. The first such factor (rotated to a normalized varimax criterion of simple structure) accounted for 25% of the variance in the instrument. This factor contained 13 items with loadings of .40 or greater and converged closely with the physical assault class of provocation events, including additional items describing some tangible or operant insult or obstruction. The second factor resulting from this analysis consisted of eleven items with loadings of .35 or greater. This factor comprised ten of the eleven items sorted a priori into the humiliation or verbal insult class of provocations and an additional item. Taken together, these items pertain to social or interpersonal devaluation.

Scales were constructed based upon these factors employing the procedure described above for RBAS subscales. The text of the humiliation and verbal insult subscale, "anger (HVI)" derived from the Novaco Provocation Inventory, which is here considered to operationalize threat proneness is presented in Appendix B.

As in previous work, our analyses utilized performance data consisting of rifle marksmanship score, physical fitness test score, and oral and written tests of military knowledge obtained from training regiment archives according to platoon rosters. Also, senior drill instructors were asked to rate all graduating recruits in their platoon on the dimensions of motivation, cooperation, intelligence, and overall performance. Ratings were accomplished within 48 hours of graduation and ranged on a five point scale from "unsatisfactory" to "outstanding". To anchor the ratings explicit instructions were issued to consider a rating of three to correspond to the average recruit.

Design. Training outcome (graduation vs. attrition) and training performance scores were examined in relation to the threat proneness, self-appraisal, and motivation measures. Because we are primarily concerned with training failure related to stress, attrition was disaggregated into "medical", "psychological/behavioral", and "other" categories based upon discharge codes, as in our previous research (Novaco, et al., 1979). It was expected that the threat, self-appraisal, and motivation factors would be associated with psychological/behavioral attrition.

Narrowing our analyses to psychological/behavioral attrition exacerbates the low base rate problem that we have previously discussed as a statistical impediment to attrition prediction (cf. Novaco et al., 1979). Because attrition prediction per se is an intractable problem, alternative statistical designs were used to address the research questions. Analyses of variance were performed on the cognitive dispositional indices according to training outcome classifications and to performance level classifications. The latter consisted of the upper and lower 20% of the performance score distributions. These extremes were selected because of the compressed

nature of the score distributions. These analyses are thus designed to identify cognitive differences at the outset of training between those recruits who eventually excel and those who perform poorly.

Since the threat proneness construct was not thought to be adequately operationalized by any individual measure, combinations of threat indices were examined. These categorical factors were used in cross-tabular analyses with training outcome classifications, thereby permitting an assessment of the association between cognitive dispositions and training success.

Table 1
RBAS Subscale Means According to Demographic
and Background Groupings

Groups	(N)	Scale 1 "Military Motivation"	Scale 2 "Negative Self-Perception"	Scale 3 "Macho"	Scale 4 "Deviance"	Scale 5 "Oversensitivity"	Scale 6 "Depression"	Scale 7 "Challenge"
High School Graduates	267	.49	-.62	.27	*** -.50	.15	* -.51	.03
Non-graduates	154	-.55	-.97	-.45	.83	-.15	.85	-.02
Parents' Marital Status				**			**	
Married	233	-.30	-.29	-.77	-.17	.04	-.66	-.06
Separated/ Divorced	145	.25	.24	.95	.25	-.01	1.02	-.09
Birth Order				*				
Oldest	103	-.63	-.86	-.97	-.16	.21	.15	-.30
Middle	80	-.51	1.02	-.68	.23	.27	.37	-.16
Youngest	234	.61	-.10	.71	-.02	-.12	-.22	.21
Raised by				*			***	
Both Parents	286	.17	-.47	-.31	-.16	.01	-.65	.03
Mother	98	-.15	.53	1.19	-.25	-.10	.68	.01
Father/other	26	.37	2.19	-1.78	1.10	-.10	3.72	-.02
Home Town Size			*					
Large City	118	-1.14	.19	.10	-.19	-.22	.10	-.15
Middle City	169	.83	-1.08	-.58	.13	-.15	-.57	.24
Small City	106	.47	.32	.22	-.28	.31	.23	-.10
Rural	29	-.90	3.79	-.14	.89	.79	1.53	-.33
Race				**	*	**	**	**
Caucasian	287	-.25	-.19	-.70	.30	.35	.20	-.26
Black	100	.13	.04	1.91	-.79	-1.04	-1.01	.50
Other	36	-2.06	.91	.06	-.18	.15	.96	.69
Sports Experience		***		***				***
Contact Individ.	200	1.46	-.45	.68	.32	-.10	-.38	.45
Contact Team	27	1.20	-.79	2.03	-.69	-.42	.37	.30
Both	36	2.14	-2.36	3.70	.16	-1.11	-.38	.67
Neither	152	-2.33	.87	-1.93	-.31	.40	.32	-.73

Note. Significant differences between groups are indicated by asterisks above the column of group means (* $p < .05$; ** $p < .01$; *** $p < .001$). The tabled values are standardized Z scores.

subscales, those recruits who had no experience in contact sports scored consistently below recruits who had individual and/or team contact sport experience. The group differences are significant at $p < .001$ for each of these subscales. High school graduation status was associated with differences in "Deviance" ($p < .001$) and "Depression" ($p < .05$), as non-graduates score higher than graduates on both subscales. Parents' marital status has significant effects for the "Macho" ($p < .01$) and "Depression" ($p < .01$) scales, as recruits with separated or divorced parents score higher than those whose parents are married. Recruits having a middle birth order were also found to be more "Macho" ($p < .05$) than those who are oldest or youngest children. Being raised by a mother alone was found to be associated with higher "Macho" scores ($p < .05$), and being raised by a father or other (e.g., grandparent) was linked with higher "Depression" ($p < .001$).

There were several scales on which differences were found between racial groups. Black recruits, in contrast to Caucasians and those categorized as "other" (Chicano, Oriental, Indian, etc., $N = 36$), score significantly higher on the "Challenge" ($p < .01$) and "Macho" ($p < .01$) scales and lower on the "Oversensitivity" ($p < .01$) and "Deviance" ($p < .05$) scales. Home town size was found to be significantly associated ($p < .05$) with "negative self-perceptions", as recruits coming from rural areas score high on this scale relative to those from large cities, medium cities, or small towns.

In contrast to findings for RBAS subscales, there were almost no significant differences on the anger scales for the background factors. Several results approach significance, but the only significant effect ($p < .05$) occurred for the "Physical Assault" provocations according to home town size. Recruits coming from rural areas report more anger on this scale,

while those from cities or small towns score lower and have comparable means.

Similarly, the test anxiety scores were, for the most part, unrelated to the background factors. The one significant result ($p < .001$) occurred for race, as differences were found between the scores of Blacks ($M = 10.28$), Caucasians ($M = 12.05$), and "others" ($M = 13.97$). High school graduates were also found to have slightly lower test anxiety than non-graduates, but this result only approached significance ($p < .06$).

Intercorrelation of Threat Indices

Since several measures were used to operationalize the threat proneness construct, their intercorrelation was examined to establish cross-validation. The threat indices consist of test anxiety, anger (HVI), RBAS "Oversensitivity", and RBAS "Challenge". All index intercorrelations are significant, except for the association of test anxiety and "Challenge". Test anxiety was correlated with "Oversensitivity" ($r = .20$, $p < .001$) and with anger related to humiliation or verbal insult ($r = .18$, $p < .001$). Anger (HVI) was directly associated with "Oversensitivity" ($r = .39$, $p < .001$) and inversely associated with "Challenge" ($r = -.20$, $p < .001$). A strong inverse correlation was found between the "Oversensitivity" and "Challenge" subscales ($r = -.43$, $p < .001$).

In addition to these intercorrelations among the threat indices, significant associations were also obtained for test anxiety with "Negative Self-Perceptions" ($r = .26$, $p < .001$), "Depression" ($r = .27$, $p < .001$), and expectations for control of reinforcement ($r = -.33$, $p < .001$). The latter result reflects the finding that high test anxious recruits tend to have

external locus of control expectancies. Anger (HVI) also was significantly related to "Depression" ($r = .17, p < .001$). "Challenge" was inversely related to "Depression" ($r = -.19, p < .001$) and to "Negative Self-Perception" ($r = -.22, p < .001$). In summary, the pattern of correlations among the threat proneness factors and between them and other variables does suggest consistency among the indices.

Threat Proneness and Attrition

The threat indices were first separately examined for their association with attrition by analyses of variance according to training outcome classifications. Significant effects were obtained for the anxiety, oversensitivity, and challenge measures but not for anger (HVI).

When recruits are categorized in terms of training outcome, there are significant differences in test anxiety, $F(3, 389) = 3.67, p < .01$. Those who receive psychological/behavioral discharges are clearly more test anxious ($M = 15.62$) than graduates ($M = 11.60$), medical discharges ($M = 11.74$), or other discharges ($M = 11.78$).

No significant effect was found for anger (HVI) according to training outcome. In general, the anger scales were unrelated to attrition. Significant differences were found between graduate and discharge categories on the "personal injustice" scale, $F(3, 381) = 3.47, p < .02$, and the "Frustration" scale, $F(3, 381) = 3.03, p < .03$, however they are largely attributable to low anger for medical attriters. Graduates and psychological attriters do not differ significantly across subscales, although the anger scores are higher for the latter group on each scale except "physical provocation".

Results for all the RBAS scales, contrasting graduating recruits with psychological/behavioral attriters are presented in Table 2. The subscales

Table 2

RBAS Subscale Means for Recruit Training Graduates and Psychological Behavioral Attriters

Training Outcome	<u>n</u>	Scale 1 "Military Motivation"	Scale 2 "Negative Self- Perception"	Scale 3 "Macho"	Scale 4 "Deviance"	Scale 5 "Over- sensitivity"	Scale 6 "Depression"	Scale 7 "Challenge"
Grads	359	.35 (9.00)	-.38 (7.97)	.24 (6.36)	.03 (3.67)	-.08 (3.44)	-.14 (6.02)	.09 (2.41)
Psych/Beh Attriters	25	-3.27 (12.64)	3.08 (9.59)	-2.86 (9.34)	.11 (3.86)	-1.66 (3.03)	1.95 (6.21)	-1.05 (2.99)

Note. Values in parentheses are standard deviations. ANOVA tests are significant for Scale 2 ($p < .04$), Scale 3 ($p < .03$), Scale 5 ($p < .02$), and Scale 7 ($p < .03$). The tabled values are standardized Z scores.

indexing threat proneness are "Oversensitivity" and "Challenge", both of which reflect significant between group differences. Recruits discharged for psychological reasons begin training with significantly higher scores on "Oversensitivity" and lower scores on "Challenge".

Since no one of our threat indices by itself was thought to fully operationalize the threat proneness construct, combinations of the indices were examined. The procedure consisted of pairing each of the four indices with each other index, and then comparing subjects who were high on both indices with those who were low on both indices. The rationale for this approach is that our research questions concern personality types, and we here focus on the combination of threat attributes. The adopted procedure allows us to isolate groups of subjects who are extreme (upper and lower tertiles) on the relevant dimensions. Because of the sample size, we could not select on more than two indices simultaneously. The sequentially pairing of the 4 indices generates 6 combinations (anxiety/ anger; anxiety/ oversensitivity; anxiety/ challenge; anger/ oversensitivity; anger/ challenge; oversensitivity/ challenge) for which conjoint extremes (low vs. high) were cross tabulated with attrition outcome (graduation vs. psychological/ behavioral attrition). This analysis, in effect, amounts to determining whether the attriters can be isolated according to the threat dimensions.

The results are contained in Table 3. It can be seen that, across all index pairs, low threat proneness is associated with the absence of attrition. The test of association is significant for anxiety/challenge, $\chi^2 (1) = 4.72$, $p < .03$, and for anxiety/oversensitivity, $\chi^2 (1) = 7.21$, $p < .007$. It also approaches significance for anxiety/anger, $\chi^2 (1) 3.10$, $p < .08$. While the base rate for attrition weighs against obtaining statistically significant effects, it is surely noteworthy that there are few cases of attrition in the low threat category across all indices.

Table 3

Crosstabulation of Training Outcome with Threat Proneness
as Defined by Index Combinations

Threat Index Combination	Low Threat Proneness		High Threat Proneness	
	Graduate	Attriter	Graduate	Attriter
Anxiety/Anger	38	0	36	5
Anxiety/Oversensitivity	46	0	30	7
Anxiety/Challenge	43	0	57	9
Anger/Oversensitivity	12	0	54	6
Anger/Challenge	47	1	77	6
Oversensitivity/Challenge	75	3	58	8

Note. Each row contains the categorical distribution of recruits in the low and upper tertiles on both threat indices. For the anxiety, anger, and oversensitivity indices, the low threat category corresponds to low values on the index, and the high threat category corresponds to high values. For the challenge index, it is inverse. The X^2 tests of the crosstabulation of threat and training outcome categories are significant for anxiety/oversensitivity ($p < .007$) and anxiety/challenge ($p < .03$) and approach significance for anxiety/anger ($p < .08$). The attrite category pertains to psychological/behavioral attrition.

It can be seen from the results in Table 3 that test anxiety is the most potent threat index, since the significant results occur for those index pairs involving the anxiety factor. This prompts the question of whether the results are solely due to the anxiety factor. Performing the crosstabular analyses for the individual indices, significant effects were found for anxiety by itself (12.1% attrition for high anxiety vs. 1.1% attrition for low anxiety), $\chi^2 (1) = 7.60, p < .006$. However, although the effects for anger and challenge were not significant, oversensitivity by itself was significant, $\chi^2 (1) = 5.38, p < .02$ (9.9% rate for high oversensitivity vs. 2.3% attrition for low oversensitivity). Therefore, while the index combinations do not improve the differentiation of attriters much beyond that which can be obtained by the anxiety factor alone, the oversensitivity factor also differentiates graduates from attriters.

Self-Appraisals, Motivation, and Attrition

Self-appraisals were operationalized by two RBAS subscales, "Negative Self-Perceptions" and "Macho". Correlations between "Negative Self-Perceptions" and the threat dispositional variables have been reported above. Concurrent validity for this scale is further supported by its correlation with a locus of control measure (Nowicki & Strickland, 1973). Scores on "Negative Self-Perceptions" are inversely related to the locus of control measure ($r = -.36, p < .001$), indicating that recruits with expectancies for internal control of reinforcement report significantly fewer "Negative Self-Perceptions". As we have previously reported (Cook, Novaco, and Sarason, 1979), a trichotomized grouping of recruits according to locus of control had a significant association, $\chi^2 (2) = 7.49, p < .05$, with attrition. The attrition rates were 7% for internals, 13% for mid-range, and 17% for external locus of control recruits.

The relationship of self-appraisals to attrition was examined by analyses of variance according to training outcome. As presented in Table 2, graduates have significantly fewer "Negative Self-Perceptions" and identify themselves as significantly more "Macho" than psychological/behavioral attriters, $F(1, 382) = 4.27, p < .04$ and $F(1, 382) = 5.19, p < .02$ respectively.

Significant differences in motivation were also found in analyses according to training outcome. While the results for the "Military Motivation" scale approach significance ($p < .06$), the effects are significant for "Motscale", $F(1, 382) = 5.57, p < .02$, as psychological/behavioral attriters ($M = -2.05$) have lower scores than graduates ($M = .34$).

Threat, Self-Appraisals, and Motivation

We had theorized that threat proneness would result in maladjustment particularly when self-appraisals and motivation are low. After cross-tabulating the threat index pairings with training outcome, we sought to determine whether the self-appraisal and motivation indices improved the categorization of the psychological/behavioral attriters. That is, when the self-appraisal and motivation indices are added to the threat factor combinations, can the attriters be discriminated further? Since attrition was virtually absent in the low threat condition (Table 3), we selected for high threat and then crosstabulated training outcome according to the separate self-appraisal and motivation indices, again using upper and lower tertiles.

The frequencies for this set of crosstabulations are contained in Table 4. It can be seen that those recruits who attrite tend to be characterized by low motivation and low self-appraisals. The low cell

Table 4
Training Outcome for High Threat Recruits as Separately Crossstabulated
with Efficacy and Motivation Factors

High Threat Index and Training Outcome	Motivation		"Motscale"		Efficacy		"Macho"	
	"Military Motivation"		"Motscale"		"Negative Self-Perceptions"		"Macho"	
	low	high	low	high	low	high	low	high
<u>Anxiety/Anger</u> graduates	12	10	12	14	13	10	9	10
attriters	3	2	3	2	2	3	2	1
<u>Anxiety/Oversensitivity</u> graduates	13	8	12	5	11	13	8	12
attriters	5	1	6	1	2	5	4	2
<u>Anxiety/Challenge</u> graduates	14	4	13	5	8	10	12	5
attriters	7	0	6	0	1	5	5	1
<u>Anger/Oversensitivity</u> graduates	15	20	18	22	22	18	11	23
attriters	3	0	5	0	2	4	2	0
<u>Anger/Challenge</u> graduates	18	4	16	8	8	12	9	8
attriters	3	0	3	0	2	2	2	0
<u>Oversensitivity/Challenge</u> graduates	35	8	31	7	14	23	27	12
attriters	7	0	7	0	2	4	5	1

Note. Each crossstabulation was performed on those recruits classified as high threat by the respective index pairs.

frequencies, further diminished by the preselection for high threat, weigh against obtaining significant χ^2 values. Only the anger/oversensitivity effect for motivation approaches significance ($p < .07$). However, the pattern of cell frequencies does suggest that the motivation indices and, to a lesser extent, the measures of self-appraisal do add to the threat factors in classifying the attriters.

Performance Measures

As we have previously discussed (Novaco et al., 1979), the recruit training process produces performance scores that are characteristically low in variance. This makes it difficult to predict from person-centered psychological variables at entry, both because of the powerful effects of the environment and the compressed nature of the performance distributions. We therefore began with the computation of correlations between the performance measures and the threat, self-appraisal, and motivation scales; then, we identified groups of high and low performers and conducted analyses for these groups on the various cognitive factors.

Generally, the indices of threat disposition either were not correlated or had weak relationships with performance variables. Test anxiety was uncorrelated with marksmanship, physical fitness test, and the oral and written tests of military knowledge. Statistically significant but small magnitude ($r = -.10$ to $-.12$) inverse correlations were found for the drill instructor ratings. Recruits high in test anxiety are rated poorly by their drill instructors at graduation on the dimensions of motivation, intelligence, and overall performance. "Oversensitivity" was inversely associated with physical fitness test, ($r = -.11$, $p < .033$) indicating lower performance for recruits scoring highly on this scale. Neither "Challenge" nor "Oversensitivity" were significantly associated with DI ratings. Correlations of the anger subscales with performance measures resulted in a few significant but low

magnitude inverse coefficients with physical fitness test and with the drill instructor ratings (r 's = $-.10$ to $-.17$). Higher anger scores were associated with lower performance, particularly with regard to motivation ratings.

Self-appraisals were not related to marksmanship scores, however "Negative Self-Perceptions" and "Macho" were both significantly associated with physical fitness ($r = -.11$, $p < .03$ and $r = .17$, $p < .001$, respectively). Positive appraisals of the self are associated with better performance. In addition, "Negative Self-Perceptions" were significantly related to the DI ratings (r 's = $-.24$ to $-.16$), indicating an association between more positive self-appraisals and higher ratings. "Macho" is also related to DI ratings of motivation and overall performance ($r = .18$, $p < .001$ and $r = .10$, $p < .033$) again linking positive self-appraisals with higher performance.

Motivation was significantly associated with Physical Fitness test score, ("Motscale", $r = .14$, $p < .009$) but uncorrelated with marksmanship and tests of military knowledge. Both "Military Motivation" and "Motscale" produced significant associations with the drill instructor ratings (r 's = $.23$ to $.12$) indicating higher ratings associated with higher motivation scores.

To determine whether recruits who attained high performance scores possessed different cognitive attributes at entry than did recruits who performed poorly, high/low groupings were computed for each performance variable. The groups were defined by the upper and lower 20% of the distributions of recruit performance scores. Analyses of variance were performed on RBAS, anger, and test anxiety scales according to these factors.

For the physical fitness test groupings, significant effects were obtained for test anxiety, $F(1, 180) = 5.05, p < .03$, "Motscale", $F(1, 119) = 6.05, p < .02$, and "Macho", $F(1, 119) = 10.10, p < .002$. High performers, in contrast to poor performers, are lower in test anxiety (15.2 vs. 17.8), higher in motivation (1.37 vs. -1.26), and higher in "Macho" scores (2.80 vs. -.66). In addition, the results for "Negative Self-Perceptions" approach significance ($p < .07$), as poor performers are higher on this scale.

While no significant effects were found for the groupings on marksmanship or on oral test of military knowledge, some did occur for the written knowledge test. A very strong result was found for test anxiety, $F(1, 160) = 45.08, p < .00001$. Those who are poor performers ($M = 20.6, S = 6.7$) are much more test anxious than those who perform well ($M = 13.4, S = 6.9$) on the written test. Another result in the comparison of high and low performers on written test of military knowledge was that low performers were found to have lower "Deviance" scores than high performers (-1.38 vs. .18), $F(1, 97) = 4.19, p < .04$. This result is difficult to interpret. Since the mean for the good performers is close to the population mean (Z scores), one cannot assert that the good performers are achieving high test scores by deviant methods.

A number of performance group differences were found with regard to drill instructor ratings of motivation, intelligence, and overall performance (no effects were found for ratings of cooperation). The group differences principally occur on "Negative Self-Perceptions", "Macho", and "Motscale". The means are presented in Table 5. Recruits who receive high motivation ratings by their drill instructors at graduation begin training with significantly lower negative self-perceptions, $F(1, 85) = 4.90, p < .03$, higher "Macho" scores, $F(1, 85) = 7.84, p < .006$, and high self-reported motivation, $F(1, 85) = 8.88, p < .004$. Those receiving high intelligence ratings are also lower in negative self-perceptions, $F(1, 77) = 8.09, p < .006$, and

Table 5

RBAS Subscale Means for Low vs. High Performers
Based on Drill Instructor Ratings

RBAS Subscale	Drill Instructor Ratings					
	Motivation		Intelligence		Overall Performance	
	low	high	low	high	low	high
"Negative Self-Perceptions"	.40 ($p < .03$)	-3.22	3.64 ($p < .006$)	-2.09	2.60 ($p < .004$)	-3.13
"Macho"	-.97 ($p < .006$)	2.80	-.84 (NS)	1.52	-.64 (NS)	1.79
"Motscale"	-.66 ($p < .004$)	3.40	-2.96 ($p < .001$)	2.82	-2.15 ($p < .001$)	3.53

Note. The low/high groupings are defined by the lower and upper 20% of the distributions of the drill instructor ratings. The significance levels for the ANOVA Comparison of means are given in parentheses.

higher in self-reported motivation, $F(1, 77) = 11.99, p < .001$. Similarly, the groupings on overall performance are distinguished by negative self-perceptions, $F(1, 63) = 9.08, p < .004$, and motivation, $F(1, 63) = 11.91, p < .001$. Thus, the self-appraisal and motivation measures taken at the start of training do have a significant association with post-training evaluations by drill instructors.

In addition, the high vs. low motivation rating groups were also distinguished by several anger scales. Recruits receiving high motivation ratings reported less anger on the "annoyance" ($p < .04$), "personal injustice" ($p < .04$), and "personal clumsiness" ($p < .04$) subscales. No significant effects were found for the anger (HVI) subscale or for any other threat proneness index with regard to the drill instructor ratings.

Discussion

The results demonstrate that on the first day of training there exist significant differences between the cognitions of recruits destined to graduate and those who will attrite for psychological or behavioral reasons. Successful recruits, in contrast to the attriters, report significantly lower levels of thoughts related to failure, upset, and worry and more readily perceive the training experience as challenging. Attriters are more inclined to perceive themselves negatively and are less motivated to succeed in training. The data further suggest that the combination of high threat proneness with negative self-appraisals and low motivation is a disposition linked with psychological/behavioral attrition. Beyond attrition per se, it also appears that some of the same variables associated with attrition are related to the performance of those who complete training.

With regard to our main operational variables, the newly developed RBAS subscales received some validation support in analyses conducted

concerned with the person's thoughts. However, it is possible that susceptibility to anger at insult or humiliation is not as dysfunctional in recruit training as we had surmised. The energizing effects of such anger may outweigh the disruptive effects, and perhaps recruits readily find appropriate outlets for anger (e.g. frequent opportunities for ventilation during physical exercise).

Although the anger (HVI) scale had little association with recruit training measures, another NPI scale not used as a threat index was significantly associated with training outcomes. Anger in response to physical provocation was found to be significantly higher for graduates than for psychological or medical attriters. The physical provocation scale on the Novaco instrument has been found in our longitudinal follow-up of this same recruit cohort to be significantly related to a variety of personal adjustment, attitudinal, and commanding officer evaluation measures. Recruits who begin training with higher scores on the physical provocation scale have higher scores on the follow-up measures.

The results for the various RBAS subscales are, on balance, encouraging for this newly designed measure. Both RBAS scales designed to measure threat perceptions specific to recruit training resulted in significant between-groups differences with the training outcome factor. "Oversensitivity" was also found to have a significant relationship to attrition rate, although "Challenge" did not. Neither scale had a noteworthy association to performance, which was primarily associated with the RBAS self-appraisal and motivation scales.

As hypothesized, recruits graduating from training were characterized by higher self-appraisals and higher motivation than attriters. While the self-appraisal and motivation measures taken at the start of training have significant associations with performance measures and post-training

evaluations by drill instructors, the threat indices were less correlated with training performance. One explanation for this phenomenon is that the threat-prone recruit attrites prior to the performance tests. The absence of recruits scoring in the extreme on the threat dimension may diminish the overall association between threat and performance indices.

Some theoretically important variables known to mediate stress have not been measured or addressed in the present project. In particular, we have not assessed social support or cognitions about social resources which can be expected to influence the occurrence and course of stress reactions. In subsequent work we have made efforts to assess recruits' beliefs about available resources for coping with the demands of training.

The present research has dealt with cognitive attributes as measured at a single data point. We do not wish to imply by our use of the present design that these variables are regarded as static or structural personality characteristics which are stable over time. In contrast to a linear causal model, we believe that a transactional relationship exists between the recruit and the training environment. It is likely that the recruit's appraisal of training events fluctuates between threat and mastery over the course of training. Certainly threat perceptions, self-appraisals, and motivation change to accomodate feedback associated with the recruit's performance. However, the majority of stress-related (psychological/behavioral) attrition does occur within two weeks of the measurements taken.

Our earlier research has documented the influence of training units on attrition (Novaco et al., 1979; Sarason et al., 1981). Yet we must still identify the properties of training unit environments which result in differential rates of attrition. By measuring changes in the cognitive dimensions reported here we may learn more about the social climate

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